



RAILROAD COMMISSION OF TEXAS

HEARINGS DIVISION

PROPOSAL FOR DECISION

OIL AND GAS DOCKET NO. 08-0289657

THE APPLICATION OF LOTUS, LLC PURSUANT TO STATEWIDE RULE 46 TO AMEND A COMMERCIAL PERMIT TO INJECT FLUID INTO A RESERVOIR PRODUCTIVE OF OIL OR GAS, DAVIS LEASE, WELL NO. 1D, FUHRMAN-MASCHO FIELD, ANDREWS COUNTY, TEXAS

HEARD BY: Paul Dubois – Technical Examiner
Terry Johnson – Hearings Examiner

APPEARANCES:

REPRESENTING:

APPLICANT

Matthew Sjoberg
Dan Snow
David Klatt
Bruce Miller
Joe Linderhood
Edward Philley

Lotus LLC

PROTESTANT

John Hicks
Britton McQuien

BTA Oil Producers LLC

PROCEDURAL HISTORY

Application Filed:	April 1, 2014
Protest Received:	March 19, 2014
Request for Hearing:	May 30, 2014
Notice of Hearing:	June 30, 2014
Date of Hearing:	September 8-9, 2014
Transcript Received:	September 18, 2014
Proposal For Decision Issued:	January 27, 2015

STATEMENT OF THE CASE

Pursuant to Statewide Rule 46 (16 Tex. Admin. Code § 3.46), Lotus LLC (Lotus)(Operator No. 509366) seeks to amend its existing disposal permit (Permit No. F-07746, Tracking No. 40438) for its Davis Lease (No. 25346) Well No. 1D (API No. 003-01255) (herein the "Davis Well 1D). By the proposed amendment, Lotus requests authority to:

1. Expand the open hole injection interval (currently from 4,472 feet to 5,700 feet) to the original wellbore total depth of 11,075 feet, by removing a cement plug at a depth of 5,700 feet;
2. Increase the maximum surface injection pressure from 1,000 pounds per square inch (psi) to 2,000 psi;
3. Increase the maximum daily injection rate from 3,000 barrels per day (BPD) to 5,000 BPD; and,
4. Allow for disposal of Resource Conservation Recovery Act (RCRA) exempt non-hazardous oil and gas waste.

Two miles west of the subject well, Lotus operates a disposal facility for naturally occurring radioactive material (NORM) generated by the oil and gas industry. As a part of the NORM disposal facility, Lotus requires the ability to dispose of non-NORM liquid waste, and primarily relies on its Lotus Well No. 1 (Lease No. 35507, API No. 42-003-00244) for this purpose. Amending the disposal permit for the Davis Well 1D will provide Lotus with relief capacity for its existing disposal well when needed. The application is protested by BTA Oil Producers LLC (BTA), an operator of nearby wells in various San Andres and Clear Fork fields.

After the hearing and on its own volition, Protestant BTA submitted late-filed Exhibit Nos. 15, 16, and 17 for the Examiners' consideration. In response, Applicant Lotus submitted its own late-filed Exhibit Nos. 20 and 21. Both parties' late-filed exhibits are hereby admitted into the record.

The Railroad Commission may grant an application for a disposal well permit under Chapter 27 of the Texas Water Code, Subchapter C, in whole or part and may issue or amend a permit if it finds:

1. The use or installation of the injection well is in the public interest;
2. The use or installation of the injection well will not endanger or injure any oil, gas, or other mineral formation;

3. With proper safeguards, both ground and surface fresh water can be adequately protected from pollution; and
4. The applicant has made a satisfactory showing of financial responsibility as required by Section 27.073.

The Examiners recommend the application for an amended permit be denied. The Applicant has not demonstrated that the installation and use of the disposal well meets the requirements of Chapter 27 of the Water Code and Statewide Rule 46. Specifically, the existing condition of the proposed wellbore is substandard and the proposed recompletion does not address these shortcomings. The Applicant has not demonstrated that the amended permit is in the public interest or fresh groundwater will be adequately protected from pollution.

The Examiners note that the notice of hearing in this matter lacks the word "amended" to show the subject application seeks to amend an existing permit. Rule 46 contains no distinction between original and amended permits in its requirement of notice to all affected persons as defined by the rule. The record in the case demonstrates that notice of the subject application was provided to all affected persons as required by the rule. The Examiners hold that the lack of the word "amended" amounts to an immaterial variance and that notice in the case at hand meets the requirements of Rule 46.

On January 8, 2015, by letter copied to the parties, the Examiners notified Dave Hill, Manager of the Commission's Underground Injection Control Unit, that Lotus had made material changes to the Davis Well 1D wellbore and that the well was no longer compliant with its existing commercial disposal permit.

MATTERS OFFICIALLY NOTICED

The Examiners take official notice of archived Commission records for the well completion and disposal well permitting of the Lotus Lease Well No. 1 (API No. 42-003-00244, W-14 Permit No. 10799). By letter dated January 8, 2015, the Examiners notified the parties that official notice would be taken of the above-referenced documents.

DISCUSSION OF EVIDENCE

APPLICANT'S EVIDENCE

Three witnesses testified on behalf of Lotus: Mr. Dan Snow, Lotus Manager; Mr. David Klatt, P. E., consulting petroleum engineer; and Mr. Bruce Miller, P. G., consulting petroleum geologist.

Lotus' Rationale for the Amended Permit

Mr. Dan Snow, Manager, testified to the need for the amended disposal permit. Lotus operates a NORM disposal facility in Andrews County, Texas. The Lotus NORM disposal facility is one of three such facilities in the United States—all in Texas—that use underground injection to dispose of NORM waste generated by oil and gas activities. The facility consists of three wells drilled into a solution-mined salt cavern in the Salado Formation. The cavern is filled with brine; as NORM waste is injected into the cavern for disposal, a comparable volume of brine is displaced. The displaced brine, which is not classified as NORM, is disposed by injection into the Lotus No. 1 Well No. 1 (W-14 Permit No. 10799, issued December 17, 1996). The Lotus No. 1 is authorized to dispose of 5,000 BPD of waste into an open hole (un-cased) interval from 5,210 feet to 10,300 feet.

Mr. Snow stated that Lotus is experiencing increased demand for its NORM disposal services. Lotus has applied to the Commission for permits to create a second NORM disposal cavern in the Salado Formation. Because of the increased need for NORM disposal and its plans to increase capacity at the NORM disposal facility, Lotus seeks to use the Davis Well 1D as a relief well for the Lotus No. 1.

Without the relief capacity provided by the Davis Well 1D, Mr. Snow stated the facility may need to suspend operations in the event the Lotus No. 1 becomes unavailable. The Lotus facility operates six days a week, 10-hours a day. Mr. Snow stated the additional disposal well capacity will allow Lotus to continue on this schedule without having to go to round-the-clock operation.

The Davis Well 1D is located about 2 miles east of the Lotus NORM disposal facility. Lotus acquired a share in the Davis Well 1D in approximately 2000. On July 20, 2011, Lotus became the full owner of the Davis Well 1D, the 2.1 acre disposal well tract and a nearby 3.67 acre tract containing associated surface facilities and a tank battery. The Davis Well 1D wellbore provides Lotus with an existing permitted commercial disposal well conveniently located near its existing facility. To provide relief capacity for the Lotus No. 1 well, Mr. Snow stated that Lotus is asking that the current commercial disposal permit for the Davis Well 1D well be amended so that it is "similarly permitted" to the Lotus No. 1 well.¹ The Davis Well 1D will not be used for the disposal of NORM waste, however. Lotus plans to pipe, not truck, the disposal fluids from the NORM facility to the Davis Well 1D. Attachment A is a wellbore schematic.

¹ Tr. pg. 25, Ins. 22-25.

The Davis Well 1D Wellbore

Original Completion

The Davis Well 1D was originally drilled as the Felmont Oil Corporation, Lotus Oil Co. Lease, Well No. 1, on August 13, 1955. The well was drilled to a depth of 11,075 feet; it was a dry hole and immediately plugged. The plugging report indicates the wellbore was completed with 248 feet of 13 3/8 inch surface casing and 4,472 feet of 9 5/8 inch production casing. On abandonment, three cement plugs were placed in the wellbore at depths of: (1) 0 feet to 38 feet (surface plug); (2) 4,413 feet to 4,610 feet (across the bottom of the deepest casing string); and (3) 10,877 feet to 11,075 feet. The remaining wellbore was filled with mud-laden fluid.

However, there was no documentation of the type and quantity of cement placed behind either of the two casing strings (i.e., Form W-15 or the 1955 equivalent). A Form W-2 was not filed because the wellbore was a dry hole.

Conversion to Injection Service

On December 6, 1978, Tejas Oil Operators (Tejas) applied for authority to inject fluid into a reservoir productive of oil or gas (Form H-1) for the subject well, now renamed the Davis Lease Well No. 1. Tejas' Form H-1 indicated 100 feet of average effective pay thickness in the 1,228 foot injection interval from 4,472 feet to 5,700 feet. Form H-1 also reported that both casing strings on the well were placed and set with cement circulated to the surface (260 sacks for the surface casing and 2,900 sacks for the production casing). No original cementing reports (Form W-15) were provided from 1955, nor were any W-15s from the 1978 recompletion provided, either.

On January 30, 1979, the Commission approved Tejas' application for injection into the Fuhrman-Mascho Field (San Andres Formation) from 4,472 feet to 5,700 feet (Permit No. F7746). Tejas was authorized to inject up to 3,000 barrels of saltwater per day at a maximum surface injection pressure of 1,000 psi. On March 1, 1979, the well was recompleted for injection service (Drilling Permit No. 041718), which included the placement of a cement plug in the wellbore at 5,700 feet.

The permit was amended on November 2, 1983, and again on December 23, 1988. The latter amendment authorized commercial disposal and required the operator to conduct an annual casing/tubing annulus pressure test (Form H-5). Mr. Snow also testified that regular mechanical integrity testing of the Davis Well 1D has not indicated tubing/casing pressure problems.

A surface casing letter was issued by the Texas Water Commission for the Davis Lease Well No. 1 on June 26, 1995, in anticipation of the well being plugged and

abandoned. The surface casing letter required the protection of ground water from the land surface to a depth of 250 feet, and in the interval from 1,200 feet to 1,600 feet. There is no evidence the well was, in fact, plugged at that time.

Proposed Recompletion

Lotus proposes—and, in fact, has—recompleted the Davis Well 1D to expand the open hole injection interval to the total depth of the original wellbore. On March 20, 2013, Lotus obtained Drilling Permit No. 758977 to recomplete the Davis Well 1D to its original total depth of 11,075 feet. Lotus worked on the recompletion from April 30, 2013 through August 13, 2013, which included drilling out the plug set at 5,700 feet. Daily drilling notes indicated several obstructions in the wellbore were encountered above and below the plug at 5,700 feet. The drill string became stuck below 9,508 feet; Lotus did not continue to the total depth of the original wellbore.

At the time of the hearing (more than a year after the recompletion activities were ended), a completion report (Form W-2) had not been filed with the Commission. Mr. Snow was initially of the opinion that a completion report did not need to be filed, but on cross examination backed away from that claim.² Mr. Snow also confirmed that Lotus was injecting 1 barrel of fluid per month into the well to clear lines and test equipment, and that the Commission's Midland District Office gave verbal approval for this periodic injection.

Mr. Klatt, a consulting petroleum engineer, testified that he reviewed relevant records in preparation of the hearing but he did not perform any engineering or geological analysis to support the development of the application. He further stated that he did not: (1) evaluate whether the San Andres Formation alone was capable of accepting the requested disposal rate of 5,000 BPD; (2) evaluate porosity and permeability data from well logs; or (3) assess the pay thickness of the disposal interval. Mr. Klatt testified that, according to the 1979 recompletion Form W-2, the Davis Lease Well No 1D has casing and cement in the hole sufficient to protect the usable quality water at 1,600 feet.

Proposed Disposal Interval

Lotus proposes to amend the current injection interval in the San Andres Formation (4,472 feet to 5,700 feet) by removing a plug at 5,700 feet and opening the original wellbore to its originally-drilled depth of 11,075 feet, resulting in a 6,603 foot open hole injection interval³. Lotus identified two other injection wells in the area with similarly large

² Tr. Vol. I, pg. 107, ln. 1 through pg. 108 ln. 12.

³ Including the San Andres, Glorietta, Clear Fork, Tubb, Wichita-Albany, Wolfcamp, Cisco, Canyon, Strawn, Barnett, Mississippian, Woodford, Devonian, Silurian, and Fusselman Formations.

injection intervals.

The Lotus Lease Well No. 1 is located about 2 miles west of the Davis Well 1D. The wellbore was originally drilled as a dry hole in 1956 and was plugged and abandoned. On December 17, 1996, the Commission issued a commercial permit (No. 10799) for the Lotus No. 1 well to inject up to 5,000 BPD NORM waste at a surface injection pressure of 2,000 psi into an open hole interval from 5,210 feet to 10,300 feet.

Sandridge Exploration and Production's (Sandridge's) Nix 19 SWD Lease Well No. 1 (API No. 42-003-43285) is located about 3 miles east of the subject Davis Well 1D. On October 27, 2011, Sandridge was granted a disposal permit (No. F-18710) for this well, and the permit was amended on September 20, 2012. This well was drilled and completed in 2011 and is authorized to dispose 25,000 BPD salt water into the subsurface interval from 4,900 feet to 12,500 feet. Although the Nix 19 SWD No. 1 well has a permitted disposal interval of 4,900 feet to 12,500 feet, the well is cased and cemented to a depth of 11,765 feet. At this time it is currently disposing via an open hole into the Ellenburger Formation only, the lowest part of the wellbore; the well casing in the remainder of the permitted injection interval has not been perforated for injection. The amended permit requires annual annulus pressure testing and weekly tubing-casing annulus monitoring. The application for the Nix 19 SWD injection permit was not protested. Injection reports (Form H-10) indicate the well routinely disposes of 6,000 to 10,000 BPD into the Ellenburger Formation at surface pressures of 820 psi or less.

Area of Review

Commission records do not identify any wellbores within the one-quarter mile area of review around the subject well. Within a one-half mile radius of the subject disposal well, five well locations were identified on commission records. The nearest well is Sandridge's Glasscock "A" Lease (No. 20314) Well No. 4-A (API No. 42-003-11058) is located 2,000 feet southeast of the subject well. BTA's JV-P Fuhrman C Lease (No. 32819) Well No. 16 (API No. 42-003-41125) is a producing well in the Fuhrman-Mascho and Nix (Clearfork) Fields and is located about 2,600 feet to the northeast. Mr. Klatt reviewed available records for the five well locations and concluded that all were completed or plugged in a manner to prevent vertical migration of injected fluids.

Nearby Hydrocarbon Production

Mr. Bruce Miller, P. G., consulting geologist, testified on behalf of Lotus with regard to current oil exploration and production trends and developments in the area. Evidence presented by Mr. Miller indicates, very broadly, two large developments in the area. East of the proposed well are several large fields in the San Andres and Clear Fork Formations, including the Fuhrman-Mascho Field. South of the proposed disposal well are older developed fields in the San Andres, Clear Fork and other formations; currently, the Three Bar (Wichita) Field is experiencing rapid development with horizontal wells, the nearest of

which are more than three miles south of the proposed disposal well. Development between these two areas appears to be segregated by a structural feature mapped by Mr. Miller on the top of the Tubb Formation. Higher structure is generally found to the southwest in the Three Bar (Wichita) Field area, and lower structures are observed to the east in the Fuhrman-Mascho area; development has been sparse in the intervening and structurally intermediate area. Although the current Three Bar (Wichita) development is focused on a structural high, the nature of the formation suggests that its productivity may not be limited by geological structure. Mr. Klatt stated that horizontal wells currently being developed in the Three Bar (Wichita) Field tend to exhibit higher initial potential tests in the southern part of the play, seven or more miles from the subject disposal well, compared to the closer horizontal wells that are three or more miles away. Mr. Klatt concludes the core area for the current Three Bar (Wichita) Field is to the south, away from the subject disposal well.

Mr. Miller stated the proposed expanded disposal interval for the Davis Well 1D is separated from the base of usable quality water by about 3,000 feet of impervious rock, including anhydrite, in the Salado and Rustler Formations.

PROTESTANT'S EVIDENCE

Mr. Britton McQuien, P. E., Permian Exploration Manager, testified for BTA. Mr. McQuien stated that BTA's primary concern with Lotus' application is the very thick open hole interval from the San Andres through the Fusselman Formations, which is nearly the entire stratigraphic column of this part of the Permian Basin. BTA also believes Lotus' disposal needs could be entirely met through the Davis Well 1D's currently permitted San Andres injection interval (4,472 feet to 5,700 feet). Further, BTA is concerned about using such an old wellbore for increased injection.

Mr. McQuien stated that in Andrews County the San Andres Formation is known to contain hydrogen sulfide (H₂S) and corrosive fluids. He stated that Statewide Rule 13 (16 Tex. Admin. Code § 3.13) requires corrosive fluids and H₂S to be isolated by casing and cement to prevent its movement to other zones. As the wellbore is proposed to be configured, corrosive fluids cannot be isolated to the formation of origin.

BTA owns mineral rights about 2,000 feet east of the subject disposal well. Horizontal development in the Three Bar (Wichita) Field is growing towards BTA's acreage, and BTA is concerned that open hole injection into the entire stratigraphic column may damage its ability to develop its resources in the future. Mr. McQuien stated the Wichita-Albany Formation is continuous and consistently present in the area. Mr. McQuien described the horizontal development in the Wichita-Albany Formation as a resource play. He reviewed potential test, drilling permits and production data for wells in the field, and he concluded that permitting and production has increased significantly in the last two years. Mr. McQuien stated that BTA has not drilled or permitted any wells into the Wichita-Albany Formation on its leased acreage east of the subject disposal well.

BTA did not present evidence to suggest the proposed injection would harm its current production.

Mr. McQuien testified that more than 50 commercial disposal wells have been permitted in Andrews County since the Davis Well 1D was originally permitted for injection in 1979. There are currently 23 active commercial disposal wells in the county, 10 of which are within an eight-mile radius of the proposed disposal well.⁴

With regard to the lack of original cementing information for the subject well drilled in 1955, Mr. McQuien stated that as a professional engineer he would not rely on cementing documentation that first appeared in 1979, 34 years after the well was drilled, and is without any original source documentation. In his opinion, a cement bond log should have been performed on the well, with remedial cementing as necessary, to verify the as-completed cement configuration. He stated there is no reliable evidence that the well is cemented through the base of usable quality water at 1,600 feet.

Mr. McQuien raised several concerns with the Lotus' 2013 recompletion workover that was performed on the Davis Well 1D. These concerns including the following:

- The drill bit tagged impenetrable material at depths of 4,626 feet, 4,733 feet, 4,780 feet, 5363 feet, observed iron sulfide returns suggesting scale or other blockage, and encountered a variety of junk materials in the hole (metal, rubber, wood, fiberglass, rocks). None of these obstructions were cement plugs.
- These obstructions above the current permitted base of the injection interval at 5,700 feet indicate the wellbore was only open to about 150 feet of the San Andres Formation for injection, from 4,472 feet to 4,626 feet (the top of the first obstruction).
- The cement plug at 5,700 feet was removed, allowing corrosive fluids in the San Andres Formation to commingle with deeper formations.

Mr. McQuien stated that BTA has experience injecting into the San Andres Formation in its nearby acreage. He stated the lower part of the San Andres was generally more porous and permeable than the upper part. In the case of Lotus' Davis Well 1D, the borehole obstructions suggest Lotus was only accessing the uppermost and least permeable part of the formation for injection. He believes the whole San Andres Formation in the Davis Well 1D would accommodate Lotus' need for 5,000 BPD disposal capacity. To resolve its protest, BTA would like to see a new plug set at the base of the San Andres Formation at 5,700 feet and verification of cement behind casing.⁵

⁴ Tr. Vol. 2, pgs. 10-11.

⁵ Tr. Vol. 2, pg., ln. 9, through pg. 28, ln. 10.

EXAMINERS' OPINION

Lotus seeks to amend the commercial injection permit for its Davis Well 1D so it can operate as a relief well for its Lotus No. 1 commercial injection well. Both wells would serve Lotus' nearby NORM disposal facility. The Examiners conclude the evidence in the record does not support Lotus' application to amend the permit. The application is deficient and Lotus failed to meet its burden of proof with regard to Texas Water Code Chapter 27.052 (1) and (3). Lotus has not demonstrated that the use or installation of the injection well is in the public interest, and with proper safeguards, both ground and surface fresh water can be adequately protected from pollution. Key factors in this application concern the Davis Well 1D wellbore—as originally constructed in 1955, subsequently recompleted, and now proposed for amended injection service. These factors will be addressed first, especially with regard to groundwater protection.

Well Construction and Groundwater Protection

Cement Behind Casing

The quality and quantity of cement behind casing is uncertain. No original cementing records are available for the Davis Well 1D. Two casing strings were set in 1955—to depths of 248 and 4,472 feet—but no documentation of cement quality and quantity are available. In 1979, when the well was originally permitted for injection, a W-2 filed with that recompletion indicated cement was circulated to the surface behind both casing strings set in 1955. This unsupported documentation came 34 years after the well was completed. The 1979 W-2 was accepted by the Commission to document the cement status on permitting the injection well for a maximum surface injection pressure of 1,000 psi and a maximum daily injection rate of 3,000 BPD. However, now that the Applicant proposes to double the maximum surface injection pressure to 2,000 psi, and to increase the maximum daily injection rate to 5,000 BPD, re-evaluation of 59 year old cement is warranted to adequately protect the base of usable quality water at a depth of 1,600 feet.

Corrosive Formation Fluids

The proposed recompletion will not prevent the vertical migration of corrosive fluids to other permeable zones in the injection interval. The San Andres Formation in Andrews County is known to contain corrosive fluids and H₂S.⁶ Therefore, removal of the cement plug at 5,700 feet and the resulting open wellbore has allowed these fluids to access other permeable zones. Statewide Rule 13(a)(1) [16 Tex. Admin. Code § 3.13 (a)(1)] states: *"...All productive zones, potential flow zones, and zones with corrosive formation fluids be isolated and sealed off to prevent vertical migration of fluids, including gases, behind the*

⁶ Tr. Vol. I, pg. 172, ln. 19 through pg. 173, ln. 6. BTA Exhibit No. 12.

casing.” During the 2013 recompletion work Lotus encountered iron sulfide deposits and other obstructions in the wellbore indicating wellbore damage in the San Andres Formation, some of which may have been caused or exacerbated by corrosive fluids.

Injection Interval

Lotus asserts that two other disposal wells in the area of the Davis Well 1D are currently permitted and actively disposing into similarly large injection intervals as that proposed for the Davis Well 1D. The evidence in the record, however, indicates the Davis Well 1D, as proposed, will not be equivalently constructed to the other two wells and will not offer comparable protection to ground water or, potentially, hydrocarbon resources.

- The **Lotus No. 1** well, two miles to the west, is permitted to inject into the open hole interval from 5,210 feet to 10,300 feet, a 5,090-foot thick interval that does not include the San Andres Formation. Commission records indicate this well was originally drilled to a depth of 11,506 feet before being plugged as a dry hole in 1956. The original plugging data—including casing and cement details—were not found in Commission records. In 1996 Lotus applied to convert the wellbore to a NORM disposal well. This application was not protested; however, at the request of the Director of the Oil & Gas Division a hearing was determined to be in the public interest. As part of the 1996 recompletion for NORM disposal service, 7-inch production casing was set in the well at a depth of 5,215 feet and cemented with 805 sacks of cement topping-out at a depth of 960 feet.
- The **Sandridge Nix 19 SWD Lease, Well No. 1** was drilled in 2011 and has a permitted injection interval of 4,900 feet to 12,500 feet. However, the well is cased and cemented to a depth of 11,775 feet. As currently completed, the well is only injecting into the Ellenburger Formation below the casing at 11,775 feet. Special permit conditions require annual annulus pressure testing and weekly tubing-casing pressure monitoring.

The evidence indicates that in both of these cases measures were taken to ensure injected fluids would be prevented from upward vertical migration along the wellbore. In the case of the Lotus 1 well, a third casing string was added and cemented inside the two original casing strings set when the well was drilled in 1956. This third casing string with cement effectively isolates the corrosive San Andres Formation fluids from infiltrating the deeper intervals and provides protection from injected fluids migrating up the wellbore. In the Sandridge Nix 19 SWD well, a large interval was approved. However, most of this interval is cased and cemented; therefore, well and injection control can be easily maintained, tested and, if necessary, repaired as most of the permitted injection interval is cased and much of it is cemented.

For these three wells, then, the clear trend over time of disposal well construction

is towards more casing and more cement. This fact is evidenced by: (1) the Subject Davis Well 1D was converted to injection service in 1979; (2) the Lotus 1 well was converted to injection service in 1996 and included the placement of a third cemented casing string through the San Andres Formation; and (3) the Sandridge Nix 19 SWD well completed in 2011 is cased and cemented through most of the injection interval, with only the lowest Ellenburger Formation section currently open hole and used for disposal. Therefore, the evidence indicates these two wells carry little weight as precedents for the present matter in which the Applicant seeks to deepen the injection interval in an old wellbore that is open to multiple formations and does not have reliable documentation of cement configuration or integrity.

Public Interest

Lotus asserts the amended disposal permit for the Davis Well 1D is in the public interest, as the well will provide relief and backup capabilities to support Lotus' nearby NORM disposal facility. Lotus' disposal operations at its NORM facility and the associated Lotus No. 1 disposal well establish the public interest for these disposal services. Generally speaking, it can reasonably be inferred that backup capabilities to prevent service interruption is also in the public interest. However, Lotus has not demonstrated that the operation of this particular Davis Well 1D, as currently permitted or proposed to be configured, is in the public interest for these purposes. In fact, evidence in the record proves otherwise.

Other than the testimony of Mr. Snow, Lotus did not provide any evidence to substantiate its current or potential future capacity needs for disposal by underground injection. Lotus did not provide any evidence to demonstrate its existing capacity was insufficient for present or potential future needs. The Lotus No. 1 well is currently permitted to dispose of 5,000 BPD waste into an open-hole injection interval from 5,210 feet to 10,300 feet. From April, 2006, through March, 2014, the daily injection volumes for the Lotus Well No. 1 averaged less than about 1,200 BPD.⁷ In March 2009 the well injected at an average rate of about 3,600 BPD. From January through March 2014, the most recent data available, the average injection rate was about 1,500 BPD. No evidence was offered to indicate whether the Lotus Well No. 1 is in anyway limited in terms of its current or potential future disposal capacity. Lotus has applied for a permit to construct a

⁷ BTA Cross Exh. No. 2. The Examiners note the months of October 2011, December 2011, January 2012, and February 2012 had reported values grossly in excess of any of the other historical reported values, and in excess of the permitted disposal capacity of the well. The Examiners further note that after the hearing, the Commission's mainframe database indicated the suspect values were reduced, although still comparatively high. The adjusted values were used by the Examiners to calculate an average daily injection rate of about 1,200 BPD.

second NORM disposal cavern at its facility, but did not offer evidence of projected non-NORM fluid disposal requirements. Lotus has not demonstrated that expanded capacity is necessary.

Lotus has not demonstrated that its existing capacity in the Davis Well 1D is insufficient to meet its disposal needs as a relief well in backup to the Lotus No. 1 well. Lotus has been a part owner of the Davis Well 1D since 2000, and the sole owner since 2011. The Davis Well 1D is currently permitted to inject 3,000 BPD salt water into an open hole injection interval in the San Andres Formation from 4,472 feet to 5,700 feet, a 1,228-foot thick disposal interval. This well has not been used for disposal for at least eight years, with very limited exceptions: (1) 2,924 barrels in March 2013, and 5,369 barrels in April 2013 (approximately 180 barrels per day); and (2) 1 barrel per month since May 2013. No evidence was offered by Lotus to indicate that, with regard to Lotus' own future needs, this well was in any way limited in terms of disposal capacity or surface injection pressure.

Lotus has altered the Davis Well 1D wellbore resulting in a material change to the permit conditions and has not notified the Commission. Lotus re-entered the Davis Lease Wellbore in 2013 and removed the cement plug at 5,700 feet. The removal of the cement plug is a material change to the wellbore, opening a larger interval to injection. There is no evidence that Lotus informed the Commission's Technical Permitting staff of this material change to the wellbore. A W-2 for the recompletion work has not been filed with the Commission. Statewide Rule 16(b) [16 Tex. Admin. Code § 3.16 (b)] states: "*The operator of a well shall file with the Commission an amended completion report within 30 days of any physical changes made to the well, such as any change in perforations, or openhole or casing records.*" On January 8, 2015, the Examiners notified Dave Hill, Manager, Underground Injection Control, that Lotus had made material changes to the Davis Well 1D wellbore and that the well was no longer compliant with its existing commercial disposal permit.

The Davis Well 1D is permitted to inject into the disposal interval of 4,472 feet to 5,700 feet, which comprises the whole San Andres Formation. During the recompletion, Lotus encountered wellbore obstructions at several locations above the cement plug. Thus, it appears that only a 150 to 200 foot thick interval of at the top of the San Andres Formation was available for disposal. The full disposal capacity of the entire San Andres interval was not available to disposal due to the obstructions. According to the evidence, Lotus did not conduct any studies to evaluate whether the existing permitted San Andres Formation interval, if free from obstruction, would be sufficient to accommodate Lotus' disposal capacity needs, needs which were themselves not defined. Mr. Snow and Mr. Klatt both stated that they did not evaluate the potential disposal capacity of the full San Andres Formation. BTA offered evidence, un rebutted by Lotus, that the lower portion of the San Andres Formation exhibits better porosity and permeability than the upper part.

Protection of Oil, Gas, or Other Mineral Formation

The evidence in the record indicates that the proposed amended injection permit will not result in harm to any currently producing oil, gas, or other mineral formations. BTA did not present evidence to suggest the proposed injection would harm its current production. The parties disagree over the potential for future economic development of the Wichita-Albany Formation at and near the location of the Davis Well 1D. The Wichita-Albany Formation is one of the formations transected by the proposed open-hole injection interval in the Davis Well 1D. BTA provided evidence to show that the Wichita-Albany Formation is a continuous resource play; horizontal development of the Wichita-Albany Formation may be productive in the area. Lotus provided evidence, disputed by BTA, that the better Wichita-Albany production is to the south and moving away from the subject well. However, there is no evidence of current active Wichita-Albany production or issued drilling permits within two miles of the subject well.

Financial Responsibility

Lotus has an active Form P-5 and has established required financial assurance. The requested permit amendment does not alter or require additional demonstration of financial responsibility from Lotus. The Examiners conclude the Applicant has met the financial responsibility requirements of the Texas Water Code.

FINDINGS OF FACT

1. Notice of the application was published in *The Andrews County News*, a newspaper of general circulation in Andrews County, on April 27, 2014. Notice of the application was mailed on March 18, 2014 to the Andrews County Clerk and offset operators within a one-half mile radius of the propose site; the Applicant is the surface owner of the disposal tract.
2. Lotus, LLC proposes to amend its existing permit for the Davis 1D (API No. 42-003-01255) as follows:
 - a. Expand the open hole injection interval from the current 4,472 feet to 5,700 feet interval, to the proposed 4,472 feet to 11,060 feet interval by removing a plug in the wellbore;
 - b. Increase the maximum surface injection pressure from 1,000 psi to 2,000 psi;
 - c. Increase the maximum daily rate of injection from 3,000 BPD to 5,000 BPD; and,

- d. Allow for disposal of RCRA-exempt non-hazardous waste.
3. The Davis Well 1D was originally drilled as the Felmont Oil Corporation, Lotus Oil Co. Lease, Well No. 1, on August 13, 1955.
 - a. The well was drilled to a depth of 11,075 feet and was a dry hole.
 - b. The plugging report dated on August 15, 1955, indicates the wellbore was completed with 248 feet of 13 3/8 inch surface casing and 4,472.20 feet of 9 5/8 inch production casing.
 - c. The wellbore was open below 4,472 feet.
 - d. Three cement plugs were placed in the wellbore at depths of 0 feet to 38 feet (surface plug); 4,413 feet to 4,610 feet (across the bottom of the deepest casing string); and 10,877 feet to 11,075 feet.
 - e. Original documents from the time the well was drilled and plugged contain no information regarding the quantity or type of cement placed behind casing.
 4. On January 30, 1979, the Commission approved Tejas Oil Operators' application to convert the well to injection service (Permit No. F7746).
 - a. Tejas was authorized to inject up to 3,000 barrels of saltwater per day into the San Andres Formation from 4,472 feet to 5,700 feet, with a maximum surface injection pressure of 1,000 pounds psi.
 - b. A cement plug was placed in the wellbore at 5,700 feet.
 - c. The 1979 recompletion Form W-2 stated that both casing strings on the well were placed and set with cement circulated to the surface (260 sacks for the surface casing and 2,900 sacks for the production casing), but no original documentation was provided.
 5. The base of usable quality water is at a depth of 1,600 feet.
 6. The injection interval is separated from base of usable quality groundwater by about 3,000 feet of evaporite deposits in the Salado and Rustler Formations.
 7. Lotus recompleted the well in 2013.
 - a. The drill bit tagged impenetrable material at depths of 4,626 feet, 4,733 feet, 4,780 feet, 5363 feet, observed iron sulfide returns

suggesting scale or other blockage, and encountered a variety of junk materials in the hole (metal, rubber, wood, fiberglass, rocks). None of these obstructions were cement plugs.

- b. Prior to the recompletion, the wellbore was only open to about 150 feet of the San Andres Formation for injection because of these obstructions.
 - c. The drilling assembly got stuck at 9,508 feet; Lotus did not continue on to the original total depth of 11,075 feet.
 - d. Lotus has not filed a completion report (Form W-2) for this work.
8. The proposed amendment to the commercial disposal permit for the Davis Well 1D is not in the public interest.
- a. Lotus has not demonstrated its current injection authority for the Davis Well 1D into the San Andres Formation is insufficient to meet its need.
 - b. Lotus provided no evidence of historical, current, or future projected injection volumes necessitating the proposed amendment.
9. The proposed amendment does not include proper safeguards to adequately protect fresh groundwater.
- a. The quality and integrity of the original 1955 cementing job is undocumented.
 - b. The evidence in the record does not prove that an increase in surface injection pressure will prevent injected fluids from migrating up the wellbore and possibly into the shallow fresh water zone at 1,600 feet.
 - c. Two other nearby disposal wells (Lotus No. 1 and Nix 19 SWD No. 1) have similarly large injection intervals, but both of these wells were permitted after the Davis Well 1D and have additional mechanical safeguards to protect groundwater and other permeable intervals.
10. In 2013, the wellbore plug at 5,700 feet was removed by Lotus, LLC, materially changing the conditions of the wellbore such that it is not in compliance with its permit.
- a. The San Andres Formation in Andrews County contains corrosive fluids and H₂S

- b. Removal of the cement plug at 5,700 feet and the resulting open wellbore has allowed corrosive fluids and H₂S to access other permeable zones.
- c. The exposure of corrosive fluids and H₂S to other permeable intervals may negatively impact the well casing, cement, and the usability of other intervals for injection or potential future hydrocarbon recovery.

CONCLUSIONS OF LAW

1. Resolution of the subject application is a matter committed to the jurisdiction of the Railroad Commission of Texas. Tex. Nat. Res. Code § 81.051
2. All notice requirements have been satisfied. 16 Tex. Admin. Code § 3.46(c)
3. Lotus, LLC has failed to demonstrate that the proposed disposal well is in the public interest. Texas Water Code § 27.051(b)(1).
4. Lotus, LLC has failed to demonstrate that the fresh groundwater will be adequately protected from pollution. Texas Water Code § 27.051(b)(3).
5. Lotus, LLC has not met its burden of proof and its application does not satisfy the requirements of Chapter 27 of the Texas Water Code and the Railroad Commission's Statewide Rule 46.
6. Lotus, LLC has caused a material change to the Davis Well 1D wellbore and is therefore not in compliance with the conditions of its permit.

RECOMMENDATION

Based on the above findings of fact and conclusions of law, the Examiners recommend the application of Lotus, LLC to amend the commercial disposal permit for the Davis Well 1D be denied. Lotus has not proven that amending the disposal permit for the Davis Well 1D is in the public interest. Lotus has not proven that operation of the Davis Well 1D under the amended disposal permit will adequately protect fresh groundwater from pollution. Further, the Examiners recommend Lotus' existing commercial disposal permit for the Davis Well 1D (F-07746) be suspended until such time as the well is brought into compliance with the most recent permit amendment dated December 23, 1988.

Respectfully submitted,


Paul Dubois
Technical Examiner


Terry Johnson
Hearings Examiner

**Wellbore Schematic
Davis No. 1D
Lotus, L. L. C.
API: 42-003-01255
Active SWD**

Oil & Gas Docket No. 08-0289657
PFD ATTACHMENT A—Wellbore Schematic
Applicant's Exhibit No. 9

HOLE SIZE: 15"
Casing: 13-3/8", 46# @ 248', 260 ex

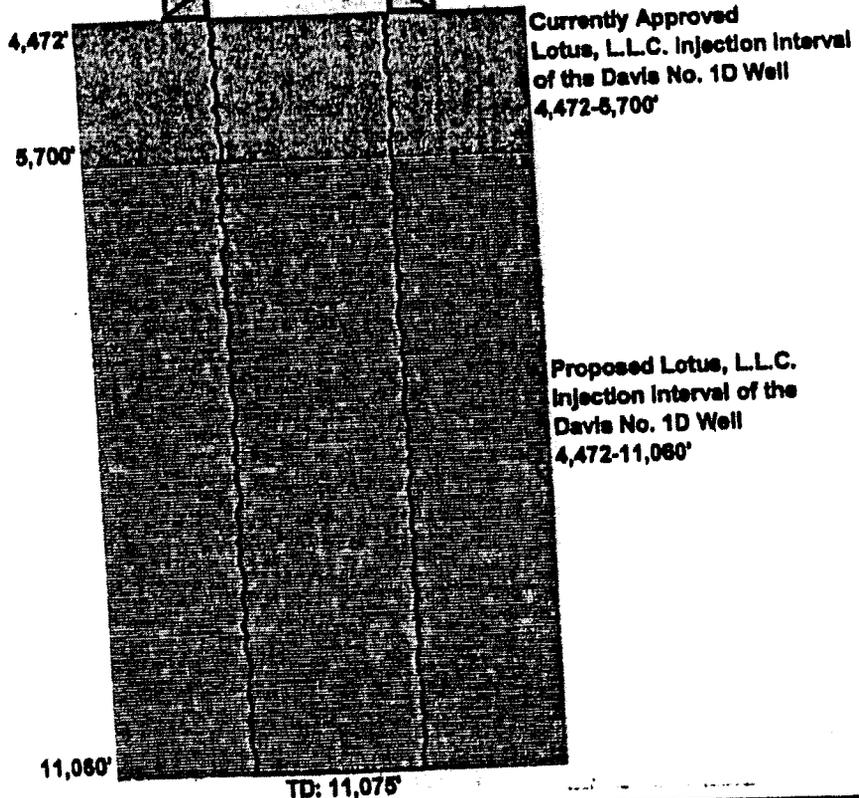
Cement to Surface

Davis No. 1D
Base of Usable Quality Water
@ 1,600'

Tubing: 3-1/2" @ 4,440'

4,430'

HOLE SIZE: 12-1/4"
Casing: 9-5/8", 43.5#
@ 4,472'; 2,900 ex



Currently Approved
Lotus, L.L.C. Injection Interval
of the Davis No. 1D Well
4,472-5,700'

Proposed Lotus, L.L.C.
Injection Interval of the
Davis No. 1D Well
4,472-11,080'

Exhibit No.: 9
Operator: Lotus, L.L.C.
Docket No.: 08-0289657
Date: September 8, 2014